about $3\frac{1}{2}$ hours, it will hardly be far from the truth to suppose *Uranus* rotates in a period of about twelve hours.

Gathering up these results as the merest approximations, we have,—

			$\pm$
Time of rotation	...	...	12 hours.
Inclination of equator		...	80°.
Long. of ascending node		...	110°.

<div align="center">Movement direct.</div>

<div align="center">2 <i>Princes Terrace, Bonner's Road, Victoria Park, E.,</i>
<i>Nov.</i> 21, 1872.</div>

On an Error in the Right Ascension of No. 3735 of Groombridge's Catalogue of Stars.   By Edwin Dunkin, Esq.

The right ascension of this star as given in the Groombridge Catalogue is derived from eleven transits, and on this account it might be considered to be a well-determined value. The Astronomer Royal's attention has, however, been lately directed by M. Argelander to a disagreement between this value and that contained in several other catalogues, the difference being far too great and irregular to be accounted for by any proper motion of the star. From a comparison of Groombridge's R.A. for 1810, January 1, with the R.A. given in the catalogues of Fedorenko's Lalande, Armagh, Oeltzen's Argelander, the Radcliffe First Catalogue, and Greenwich (1872), reduced to the same epoch, the mean R.A. of Groombridge appears to be about three seconds too small.

At the request of the Astronomer Royal, I have made a searching examination of the original calculations of the Groombridge catalogue * with the object of discovering, if possible, whether any constant error affecting each observation had been inadvertently committed in the reductions. Unfortunately, in several instances, the calculations intervening between the original observations have never been found, and for one preliminary catalogue of about 900 stars, marked A, this is notably the case. This catalogue contains seven observations, made in 1809, from September 6 to October 8, out of the total number of eleven. The remaining four, made in 1812, are included in another preliminary catalogue, marked D, formed from later observations than those in A.

As none of the calculations intervening between the " Transit

---

* The original manuscript observations and calculations have been deposited in the Society's Rooms since the publication of Groombridge's catalogue in 1838.

Book " and A can be found, and as no record is made in the cata-
logue of the date of the observations, some trouble was expe-
rienced in finding the original separate transits.   This difficulty,
was increased by Groombridge naming the star *Cepheus Bode*
197 in A, and *Cepheus Bode* 204 *p* in D.   All the transits in A,
except one, were observed over the central wire only, and
assuming that the instrumental adjustments were good, of which
there is no evidence to the contrary, the work appears to have
been accurately done.   So far as the reduction to apparent
R.A., the check is easily made in the " Transit Book."   The
only part which required an independent calculation, owing to
the absence of the original work, was the reduction to mean R.A.
1807, January 0, this being the epoch to which Groombridge
himself referred his right ascensions in catalogue A.   The
R.A. given in this catalogue reduced to 1810, January 1, is
$22^h 10^m 26^s \cdot 72$, and although too small, it is correctly reduced
from the original transits.

With respect to the four transits from which the R.A. in cata-
logue D has been obtained, the case is very different; but, fortu-
nately, we have a sure means of testing the accuracy of the
reductions of these four transits by a comparison of the separate
results for R.A. with those of a neighbouring star, differing from
3735 by less than 1' in N.P.D.   From 1812, October 29, to
November 22, this comparison star, named *Cepheus Bode* 204,
and now known as *Groombridge* 3756, was observed on several
occasions on the same evenings as 3735.   I resolved to make,
therefore, a fresh reduction of all the transits of the two stars,
which might possibly give some clue to the cause of the error
which evidently affects Groombridge's results.

As nearly all the transits used in the formation of Catalogue
A were observed only over the central wire, no error could
arise from a wrong reduction to the meridian; but as those
used in forming catalogue D were never observed over the
central wire, it occurred to me that whatever may have been the
error, the source of it, so far as these four transits are concerned,
would be found here.   I therefore calculated the following equa-
toreal corrections to be applied to each wire for reduction to the
central wire, from twenty-five complete transits of stars observed
for clock-error about the same time :—

$$
\begin{array}{lcr}
\text{Wire I.} & = & + 50 \cdot 74 \\
\text{II.} & = & + 25 \cdot 29 \\
\text{IV.} & = & - 25 \cdot 49 \\
\text{V.} & = & - 50 \cdot 55 \\
\end{array}
$$

The following table contains the separate results for each star,
the mean R.A. being reduced to 1810, January 1 :—

	Groombridge 3735.		Groombridge 3756.	
Day of Obs.	New R.A.	R.A. from MSS.	New R.A.	R.A. from MSS.
1812	h m s	s	h m s	s
Oct. 29			22 15 57·92	58·03
31	22 10 28·11	23·11	57·90	57·83
Nov. 7			58·55	58·41
15	28·47	23·61	57·14	57·32
21	28·35	24·80	58·43	58·37
22	28·17	24·62	58·61	58·54
Mean	22 10 28·28	24·04	22 15 58·09	58·08

On reducing the transits at each wire separately to the central wire, the observed time at the fourth wire on November 15, in the transit 3735, appears to be some seconds in error. I have therefore not included it.

The difference between the newly-computed R.A. of 3735 and that taken from D is no less than $4^s·24$, while the new and old results for the comparison star are sensibly the same. This is a sufficient proof that the error originated not from defective values of the intervals, as then the results for both stars would have been similarly affected, but from an accidental slip made in the reductions of 3735. The only suggestion I can make is that Groombridge, in whose handwriting the " Transit Book " appears to be, adopted an erroneous N.P.D. in the reduction of the observed transits to the meridian, and that, instead of using $14° 29'$, the correct N.P.D., he made the reduction with N.P.D. $14° 9'$. Assuming this to be the cause of the error, I have reduced each transit of 3735 to the meridian with the erroneous N.P.D., the separate results for R.A. of which are compared below with the corresponding R.A. taken from the manuscript collection of results :—

Mean R.A. 1810, January 1.

Day of Obs.	New R.A. using N P.D. 14°·9′	R.A. from MSS.
	h m s	h m s
1812, Oct. 31	22 10 23·45	22 10 23·11
Nov. 15	23·65	23·61
21	24·84	24·80
22	24·66	24·62
Mean	22 10 24·15	22 10 24·04

The result of my examination of the original calculations is thus successful with respect to the four observations from which the R.A. in catalogue D is obtained. This R.A., as corrected by me, now agrees very closely with the modern determinations. The R.A. in catalogue A, deduced from seven observations, is, however, still about two seconds too small, the cause of which

must remain unexplained ; it certainly cannot be found from an inspection of the original manuscripts.   But it is proper to remark that there is a considerable discordance between the separate daily results, the seconds of R.A. of the greatest value being 27^s·80, and of the least, 25^s·47, or a range of 2^s·33.   The following table exhibits the mean R.A. taken from several catalogues and reduced to 1810, January 1 :—

Catalogue.		Mean R.A. 1810, Jan. 1.	Epoch of Catalogue.
		h m s	
Fedorenko's Lalande	..	22 10 29·49	1790
Groombridge (A)	..	26·72	1807
,, (D)	..	28·28	1812
Armagh	..	28·93	1840
Oeltzen's Argelander	..	28·98	1842
Radcliffe 1st Cat.	..	28·31	1845
Greenwich 1872	..	28·81	1872

The mean of the R.A. in the two Groombridge Catalogues, A and D, giving a weight to each proportional to the number of observations, is 22° 10′ 27″·29.   The R.A. in the published Groombridge Catalogue is 22^h 10^m 25^s·83.

Kidbrooke, Blackheath,
  December 23, 1872.

On an observed Discordance between the Reading for Zenith-point in the Determinations with the Transit-Circle of the Royal Observatory, Cape of Good Hope. By E. J. Stone, M.A. F.R.S., Her Majesty's Astronomer at the Cape.

The Transit-Circle of the Royal Observatory, Cape of Good Hope, was designed by Sir G. B. Airy, K.C.B. Astronomer Royal.

It is similar in construction and optical power to the magnificent instrument of the Royal Observatory, Greenwich.   There are only two points of difference.   The handles for moving the instrument are removed from all connexion with the reading-circle, to the opposite side of the central cube ; and, in the original construction of the instrument, arrangements were made by the Astronomer Royal for the observation of the collimators through the central cube without the necessity of raising the instrument from its Y's.

Sir G. B. Airy has given a full description of the Greenwich instrument, with detailed plans, in the volumes of *Greenwich Observations*, 1852 and 1867.   This appears to render any description of the Cape instrument unnecessary.   Soon after taking charge of the Observatory, I had observations of α *Centauri*, β *Centauri*, and α *Eridani*, taken by reflexion and directly.